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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,084	03/02/2004	Todd W. Steigerwald	5867-00800	2937

35617 7590 03/29/2010

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ART UNIT	PAPER NUMBER
3729	

MAIL DATE	DELIVERY MODE
03/29/2010	PAPER

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TODD W. STEIGERWALD and JERRY MAYFIELD

Appeal 2009-004464
Application 10/791,084
Technology Center 3700

Decided: March 29, 2010

Before: JENNIFER D. BAHR, STEVEN D.A. McCARTHY, and FRED A. SILVERBERG, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Todd W. Steigerwald and Jerry Mayfield (Appellants) appeal under 35 U.S.C. § 134 (2002) from the Examiner's decision rejecting claims 1-9 and 24-27. Claims 10-23 have been cancelled. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

The Invention

Appellants' claimed invention is directed to a method for forming an apparatus that reduces electromagnetic interference between a pair of antennas on a wireless communication device by intercepting and scattering the electromagnetic energy (transmitted signals) radiated from an antenna. Spec. 1:5-7, 7:21-30. A plurality of resonant elements of the formed apparatus intercepts and scatters the transmitted signal by resonating at or near a carrier frequency of the signal. Spec. 8:4-10.

Claim 1, reproduced below, is illustrative of the claimed invention.

> 1. A method for forming an apparatus configured to reduce electromagnetic interference between a pair of antennas coupled to a wireless communication device, wherein the method comprises:
>
> extracting a shape of the apparatus from a thin sheet of conductive material;
>
> folding the shape into a plurality of resonant circuit elements, each configured to resonate at or near a carrier frequency of a signal transmitted by one of the pair of antennas; and
>
> wherein by the steps of extracting and folding, the apparatus is formed having a length substantially equal to one-half of the transmitted signal wavelength.

The Rejections

Appellants seek review of the Examiner's rejections under 35 U.S.C. § 112, second paragraph, of claims 1-9 and 24-27 as indefinite; under § 102(b) of claims 1-9 and 24, 26, and 27 as being anticipated by US Patent 6,411,261 B1 issued to Lilly (Jun. 25, 2002); and under § 103(a) of claims 1-9 and 24-27 as unpatentable over Lilly.

SUMMARY OF DECISION

We AFFIRM.

ISSUE

Claim 1 recites a method of forming an apparatus having a plurality of resonant circuit elements configured to resonate "at or near a carrier frequency of a signal transmitted," and wherein the apparatus has a length "substantially equal to one-half of the transmitted signal wavelength.[1]" The Examiner concluded that claim 1 is ambiguous because one of ordinary skill would not be able to determine the carrier frequency, transmitted signal wavelength, or the length of the apparatus. Ans. 3. In particular, the Examiner found that there are a wide range of transmitted frequencies within a given frequency range, such that it is not clear which frequency or frequencies would be used to form the resonant circuit elements, or which wavelength would determine the length of the apparatus. Ans. 7-8. Appellants argue that the claim need not recite an exact signal wavelength.

[1] Wavelength and frequency are inversely and proportionally related. For electromagnetic waves, such as radio waves, the wavelength (in meters) equals the speed of light (in meters per second) divided by the frequency (in per seconds, or Hertz). *See*, *e.g.*, Spec. 27, EQ. 1.

Appeal Br. 4. In particular, Appellants argue that the desired wavelength would be known beforehand, and thus the appropriate apparatus could be formed according to claim 1. Appeal Br. 5.

Therefore, the dispositive issue is whether the language alluded to by the Examiner renders claim 1 indefinite.

FINDINGS OF FACT

FF1 Appellants' invention is not limited to any particular carrier frequency[2] or range of frequencies, but instead contemplates application with any wireless communication device that transmits or receives audio, video, or data signals wirelessly. *See, e.g.,* Spec. 6:20-22. Thus, the signals alluded to in Appellants' invention are any signals within the radio frequency (RF) spectrum. *See* Spec. 7:12-17. In addition, even when a particular carrier frequency is specified, often a device actually transmits over a broad range (spread spectrum) of frequencies, to help eliminate interference, among other benefits. *See* Spec. 4:1-10.

FF2 Appellants' invention operates by forming resonant circuit elements that resonate "at (or near)" a frequency to redirect the energy from a transmitted signal. Spec. 8:4-7. By resonating, the elements attenuate the transmitted signal by intercepting and redirecting the signal. Spec.

[2] A "carrier frequency" refers to the frequency of a radio wave of fixed amplitude and frequency that is modulated to carry a signal in a radio transmission, and is thus distinguishable from the actual signal transmitted. *See* "carrier wave" in *Collins English Dictionary* (2000), http://www.credoreference.com/entry/hcengdict/carrier_wave (last visited Mar. 25, 2010).

8:4-10. That the elements can resonate "at or near" a frequency implies that the elements can "resonate" at several frequencies. *See, e.g.,* fig. 9 (noting a particular embodiment that attenuates signals to varying degrees over a wide range of radio frequencies).

FF3 Appellants' Specification describes several frequency ranges considered to be "at or near" a given carrier frequency. For example, the Specification notes that "two to three," (Spec. 9:1-3), "up to four" (Spec. 34:7-9), or "approximately 2 to 4" (Spec. 12:12-13) octaves above the carrier frequency, or even "substantially all frequency bands" (Spec. 12:13-16) could be considered frequencies "at or near" a carrier frequency or frequencies at which the resonant elements will resonate. Appellants' examples are mostly from certain frequencies that operate in an unlicensed Industrial, Scientific, and Medical (ISM) band, such as IEEE 802.11b and Bluetooth™. Spec. 17:23-28, fig. 1. However, the RF spectrum, and thus Appellants' invention, includes all those radio frequencies in the electromagnetic spectrum, generally considered lower than infrared frequencies (roughly 300 GHz), such as AM and FM radio, analog television, and microwave communication. *See* FF1, *supra*. Therefore, Appellants' broad examples do not address the vast majority of potential carrier frequencies.

FF4 Appellants' Specification describes how to determine the resonant frequency of a circuit, but not those frequencies wherein a resonant element will resonate "at or near" a carrier frequency. *See* Spec. 31, EQ. 6. The Specification depicts a range of frequencies (2.4 GHz to 7.2-9.6 GHz) whereby the apparatus blocks substantially all energy

radiated (by resonating, *see* FF2). Spec. 38:11-15, fig. 9. Figure 9, notably, does not extend past 7 GHz and depicts a wide range of signal energy attenuation.

PRINCIPLES OF LAW

The test for definiteness under 35 U.S.C. § 112, second paragraph, is whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986) (citations omitted). The second paragraph of 35 U.S.C. § 112 requires claims to set out and circumscribe a particular area with a reasonable degree of precision and particularity. *In re Johnson*, 558 F.2d 1008, 1015 (CCPA 1977). In determining whether this standard is met, the definiteness of the language employed in the claim must be analyzed, not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art. *Id.*

> Though understanding the claim language may be aided by the explanations contained in the written description, it is important not to import into a claim limitations that are not a part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.

Superguide Corp. v. DirecTV Enter., Inc., 358 F.3d 870, 875 (Fed. Cir. 2004). *See also Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (discussing recent cases wherein the court expressly rejected the contention that if a patent describes only a single embodiment,

the claims of the patent must be construed as being limited to that embodiment).

ANALYSIS

The Examiner has concluded that two particular claim limitations are ambiguous. *See* Ans. 7-8. First, claim 1 requires that the resonant circuit elements be "configured to resonate at or near a carrier frequency," and second, claim 1 requires that the length of the apparatus is "one-half of the transmitted signal wavelength." Appellants first argue that the claim does not need to recite an exact apparatus length or transmitted signal wavelength to render the claim definite. Appeal Br. 4. Appellants are correct in this regard, as breadth does not equate to indefiniteness. *See, e.g., In re Johnson*, 558 F.2d at 1016 n.17. However, the claims, even if broad, must still set out and circumscribe a particular area with a reasonable degree of precision and particularity. *Id.* at 1015. We address each of the two identified limitations below.

Resonate At or Near

Claim 1 requires "a plurality of resonant circuit elements, each configured to resonate at or near a carrier frequency of a signal transmitted." Thus, the configuration of the resonant circuit elements varies depending on the carrier frequency used by one of the two antennas, the level of oscillation by which the resonant element is considered to "resonate," as well as which frequencies are considered to be "at or near" that carrier frequency. When a term of degree is used, such as the phrase "at or near," it is necessary to determine whether the specification provides some standard for measuring

that degree. *See Seattle Box Co., Inc. v. Indus. Crating & Packing, Inc.*, 731 F.2d 818, 826 (Fed. Cir. 1984).

Appellants' invention is not limited to any particular carrier frequency or range of frequencies. FF1. Appellants' invention operates by forming resonating elements that resonate "at or near" a frequency to redirect the energy from a transmitted signal. FF2. That the elements can resonate "at or near" a frequency implies that the elements can "resonate" at several frequencies. *Id.* This creates two unknowns.

First, one of ordinary skill needs to determine which frequencies are "at or near" a carrier frequency. Appellants' Specification describes that "near" frequencies could include those frequencies about two octaves above the carrier frequency to all frequency bands. FF3. This extremely broad range is only specified for one narrow subset of possible carrier frequencies. *Id.* (noting that Appellants' examples are generally limited to a particular, narrow ISM band). A frequency range that includes virtually every frequency in a particular subset of possible frequencies is not a useful guide for determining which frequencies are "at or near" another frequency. Thus, we find that the Specification does not provide a standard to one of ordinary skill in the art to determine which frequencies are considered "at or near" a particular carrier frequency.

Second, one of ordinary skill needs to determine what constitutes "resonating" when forming the resonant elements, as the resonant elements must be folded to resonate at not only a carrier frequency, but also "at or near" that frequency. If a resonant element is to resonate over a range of frequencies then it could resonate to different degrees at different frequencies. *See, e.g.,* fig. 9 (noting the wide range of frequencies

attenuated to some level by the resonating elements of one particular embodiment). The Specification describes how to determine the resonant frequency of a circuit and depicts a single example of a configuration said to "block substantially all of the energy radiated within [a] band-gap frequency range." FF4. However, the equation only determines the resonant frequency, and not those other frequencies (such as those in figure 9) at which the resonant elements are considered to "resonate" and thus reduce the transmitted signal. In fact, figure 9 is said to "block frequencies" (by resonating, *see* FF2) from 2.40 GHz to 7.2-9.6 GHz, but the figure's axis ends at 7 GHz, and depicts attenuation levels over this "blocked" frequency range from about -27 dB to about -1 dB. As such, figure 9 does not provide useful guidance to one of ordinary skill regarding the level of resonance that is considered "resonating" within the scope of claim 1. Further, this figure only depicts the particular frequency band described therein, and does not describe or provide guidance for other radio frequencies within the scope of claim 1. Therefore, we find that the Specification does not provide a standard as to the level of oscillation considered to be "resonat[ing] at or near a carrier frequency."

Appellants describe a particular embodiment utilizing a particular signal and a particular apparatus configuration. Appeal Br. 5. That the Specification provides an example or examples does not cure the above-noted deficiency because the claims are not limited to the example(s) and the example(s) do not provide a basis to determine the metes and bounds of a resonant element that resonates "at or rear" other carrier frequencies. *See Superguide Corp.*, 358 F.3d at 875; *Liebel-Flarsheim Co. v. Medrad Inc.*,

358 F.3d at 906 (particular embodiments or examples from the Specification are not to be read into the claims).

A Length One-Half of the Transmitted Signal Wavelength

Claim 1 requires that the apparatus is formed with a length "substantially equal to one-half of the transmitted signal wavelength.[3]" The Examiner indicates that one of ordinary skill would not know the wavelength of the transmitted signal because the range of wavelengths transmitted on a given carrier varies widely. Ans. 7-8. Appellants argue that the desired wavelength would be known beforehand. Appeal Br. 5.

However, the Appellants' proffered explanation appears to be directed to the *carrier frequency*, not the actual signals transmitted. *See, e.g.,* Appeal Br. 5 ("a 2.4Ghz signal"), Spec. 9 ("the carrier frequency of the transmitted signal is equal to about 2.4 GHz"). Claim 1 requires the apparatus's length to be determined by a transmitted signal wavelength, not the carrier signal wavelength. *See* n.2, *supra* (a transmitted signal is a modulated carrier signal, and thus may have a different wavelength); *see also* FF1 (many radio devices transmit over several frequencies). Thus, the "transmitted signal wavelength" could refer to many different wavelengths. *See* FF1 (claims not limited to any particular radio frequency band).

Even if one of ordinary skill in the art were provided the carrier frequency, he or she could not determine what length to form the apparatus because for any given carrier frequency, there exists a wide range of

[3] The "transmitted signal wavelength" of claim 1, by which the length of the apparatus is determined, lacks strict antecedent basis in the claims. It appears that this phrase refers to the wavelength of the "signal transmitted by one of the pair of antennas." We construe the claim as such.

frequencies transmitted that could be a "transmitted signal" and serve as the basis for determining the length. *See* FF1. For example, even if one of ordinary skill knew that the device utilized a 2.4GHz signal (referring to the carrier signal), it would not be clear which transmitted signal's wavelength (carrier, highest, lowest, middle, most frequent, etc.) would be used to determine the apparatus's length. Appellants' Specification provides one embodiment wherein the longest wavelength (lowest frequency) used by the antenna is chosen to determine the length of the apparatus. *See, e.g.,* Spec. 33:12-15. However, particular embodiments or examples from the Specification cannot be read into the claims. *See Superguide Corp.*, 358 F.3d at 875; *Liebel-Flarsheim Co. v. Medrad Inc.*, 358 F.3d at 906. Therefore, claims 1-9 and 24-27 are insolubly ambiguous. *See Exxon Research & Eng'g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001) (a claim is indefinite if it is "insolubly ambiguous" and not "amenable to construction").

The Specification does not provide a standard by which one of ordinary skill would be able to determine the metes and bounds of an apparatus having a plurality of resonant circuit elements folded to resonate "at or near" a carrier frequency, wherein the length of the apparatus is determined by "one-half of the transmitted signal wavelength." Therefore, claim 1 is ambiguous, and the prior art rejections must fall because they are necessarily based on a speculative assumption as to the meaning of the claims. *See In re Steele*, 305 F.2d 859, 862-63 (CCPA 1962). It should be understood, however, that our decision in this regard is based solely on the indefiniteness of the claimed subject matter, and does not reflect on the adequacy of the prior art evidence applied in support of the rejection.

CONCLUSION

Claims 1-9 and 24-27 are indefinite because the metes and bounds of the configuration of the resonant circuit elements, which resonate "at or near a carrier frequency," and the length of the apparatus, which is "one-half of the transmitted signal wavelength," are insolubly ambiguous. Accordingly, we sustain the Examiner's rejection of claims 1-9 and 24-27 as indefinite. We do not sustain the Examiner's prior art rejections of claims 1-9 and 24-27 because they are necessarily based on a speculative assumption as to the meaning of the claims.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

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